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TRANSMITTAL LETTER (General - Patent Pending)

Docket No. **LWEP:122US**

In Re Application Of: **Katja Peter et al.**

Application No.	Filing Date	Examiner	Customer No.	Group Art Unit	Confirmation No.
10/773,952	**February 6, 2004**	**Mark A. Robinson**	**24041**	**2872**	**7353**

Title: **DEVICE AND METHOD FOR CONTROLLING FUNCTIONS OF A MICROSCOPE SYSTEM**

COMMISSIONER FOR PATENTS:

Transmitted herewith is:

1) Reply to Second Notification of Non-Compliant Appeal Brief (37 CFR 41.37)
1) Second Amended Appeal Brief (37 CFR 41.37) - fee previously paid on 2/7/07
1) Claims Appendix
1) Evidence Appendix with Exhibits A & B
1) Related Proceedings Appendix
1) Certificate of Mailing by First Class Mail

in the above identified application.

- ☒ No additional fee is required.
- ☐ A check in the amount of is attached.
- ☒ The Director is hereby authorized to charge and credit Deposit Account No. **50-0822** as described below.
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Signature

Dated: **July 25, 2007**

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I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to the "Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)] on **July 25, 2007**.

(Date)

Signature of Person Mailing Correspondence

Michael L. Dunn

Typed or Printed Name of Person Mailing Correspondence

cc: **MLD/MJK**

Attorney Docket No. LWEP:122US
U.S. Patent Application No.10/773,952
Date: July 25, 2007

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Katja Peter et al.

U.S. Patent Application No. 10/773,952

For: DEVICE AND METHOD FOR CONTROLLING FUNCTIONS OF A MICROSCOPE

Filed: February 6, 2004

Examiner: Robinson, Mark A.

Group Art Unit: 2872

Confirmation No.: 7353

Customer No.: 24041

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I certify that this REPLY TO SECOND NOTIFICATION OF NON COMPLIANT APPEAL BRIEF is being deposited on July 25, 2007 with the U.S. Postal Service as first class mail under 37 C.F.R. §1.8 and is addressed to the Commissioner for Patents, PO Box 1450, Alexandria, VA 22313-1450.

Michael L. Dunn
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REPLY TO SECOND NOTIFICATION OF NON-COMPLIANTAPPEAL BRIEF
(37 CFR 41.37)

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Honorable Sir:

In reply to the Second Notification of Non-Compliant Appeal Brief, please enter the enclosed amended brief. All objections were of a formal nature and no substantive amendments have been made to the Appeal Brief. All objections to the originally presented appeal brief have been overcome.

Respectfully submitted,

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MLD/mjk
Dated: July 25, 2007

Attorney Docket No. LWEP:122US
U.S. Patent Application No.10/773,952
Date: July 25, 2007

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Katja Peter et al.

U.S. Patent Application No. 10/773,952

For: DEVICE AND METHOD FOR CONTROLLING FUNCTIONS OF A MICROSCOPE

Filed: February 6, 2004

Examiner: Robinson, Mark A.

Group Art Unit: 2872

Confirmation No.: 7353

Customer No.: 24041

Certificate of Mailing by First Class Mail

I certify that this Second Amended Appeal Brief is being deposited on July 25, 2007 with the U.S. Postal Service as first class mail under 37 C.F.R. §1.8 and is addressed to the Commissioner for Patents, PO Box 1450, Alexandria, VA 22313-1450.

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SECOND AMENDED APPEAL BRIEF
(37 CFR 41.37)

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Honorable Sir:

Applicants respectfully appeal the decision of the Examiner finally rejecting Claims 1, 3 and 31 as set forth in the Office Action dated August 2, 2006 and Advisory Action of December 4, 2006. A Notice of Appeal was timely filed by the Applicants on December 20, 2006.

Real Parties in Interest

The real party in interest is LEICA MICROSYSTEMS WETZLAR GMBH, Assignee of the above application by assignment recorded in the Patent and Trademark Office at Reel 014387, Frame 0958.

Related Appeals and Interferences

There are no related appeals or interferences.

Status of Claims

The application originally contained 30 claims. Claim 31 has been added by amendment. No claims have been cancelled. Claims 1-3, 23-29, and 31 have been amended. Claims 2 and 14-30 have been allowed. Claims 1, 3 and 31 are rejected and claims 4-13 have been withdrawn from consideration. Claims 1, 3 and 31 are involved in the appeal.

Status of Amendments

No amendments have been offered that have not been entered.

Summary of Claimed Subject Matter

Claim 1 is the only independent claim on appeal and claims a device for controlling <u>functions of a microscope</u> within a microscope system. The device includes a stand base portion, a central display integrated into the stand base portion, wherein the central display can be used to perform

a plurality of settings <u>of the microscope</u> within the microscope system, to call saved settings <u>of the microscope</u> within the microscope system and to receive warning messages or notifications <u>from the microscope</u> within the microscope system and depending on the selection of the sub-main menu by the user, a respective submenu corresponding to the selected sub-main menu is displayable on the display. (supported throughout the specification e.g., page 2, lines 19-21; page 3, lines 1-23; page 11, lines 1-22; page 12, lines 1-22, page 13, lines 3-22; page 26, lines 10-22; page 27, lines 1-21; page 28, lines 1-22; page 29, lines 1-22; Fig. 1a ; Fig. 1b; Fig. 2; Fig. 3; Fig 41; Fig. 4b; Fig. 4c; Fig 4d; Fig 5a; Fig. 5b; Figures 6a-6f; Fig. 7b; Figures 8a-8k; Figures 9a-9n; and Figures 10a-10b). Dependent claim 3 claims the device as defined in Claim 1, wherein a main menu is constructed from multiple sub-main menus and depending on the selection of the sub-main menu by the user, a respective submenu corresponding to the selected sub-main menu is displayable on the display. (supported throughout the specification, e.g. page 2,, lines 19-21; page 3, lines 1-9; page 4, lines 10-15 and 19-22; page 5, lines 1-3; page 13, lines 11-22; page 14, lines 1-8; page 16, lines 9-20; Fig 1b; Fig. 2; Fig. 3; Fig 41; Fig. 4b; Fig. 4c; Fig 4d; Figures 5a – 5g; Figures 6a-6f; Fig 7b; Figures 8a-8k; and Figures 9a-9n) Claim 31 claims the device of claim 1 where the plurality of settings that can be performed includes at least one of objective selection and secondary magnification selection. (supported throughout the specification, e.g. page 3, lines 10-23; page 3, lines 1-9; page 12, lines 15-22; page 18, lines 16-22; page 19, lines 1-20; page 20, lines 1-22; page 21, lines 1-16; page 29, lines 17-22; page 30, lines 1-23; page 31, lines 1-21; page 32, lines 1-21; page 33, lines 1-8; Figures 6a-6f.; Figures 9a-9i; and Figures 11a-11i.)

Grounds of Rejection to be Reviewed on Appeal

1. Whether claim 1 is patentable under 35 U.S.C. 102 as being anticipated by U.S. Patent 6,235,014 to Abe et al; and

2. Whether claims 3 and 31 are patentable under 35 U.S.C. 103 as being obvious to one skilled in the art over Abe (et al) above.

Argument

Claim 1 has been rejected under 35 U.S.C. 102 as being anticipated by U.S. Patent 6,235,014 to Abe et al. This rejection is improper and should be reversed.

Claim 1 requires "A device for controlling functions of a microscope within a microscope system, said device comprising: a stand base portion, a central display integrated into the stand base portion, wherein the central display can be used to perform a plurality of settings of the microscope within the microscope system, to call saved settings of the microscope within the microscope system and to receive warning messages or notifications from the microscope within the microscope system."

In applying Abe et al., the Examiner states: "Abe discloses a device for controlling microscope functions including a display (3) integrated into a stand base portion, wherein the display can be used to perform settings of the microscope, call saved settings, and display warnings or notifications from the system (see also figs. 1-3).

This statement by the Examiner with respect to the disclosure of Abe et al. is incorrect and even if it were correct is insufficient to support a rejection under either 35 U.S.C. 102 or 103.

Present claim 1 requires: A device for controlling functions of **a microscope within** a microscope system..." It is clear that the claim requires **control of microscope functions** as microscope functions would be understood by one skilled in the art. A "microscope" as defined in McGraw Hill's Dictionary of Scientific and Technical Terms, 2nd edition, (1978) at page 1023 as "An instrument through which minute objects are enlarged by means of a lens or lens system". The definition has not significantly changed since 1978. Reference may presently be had on-line to http://en.wikipedia.org/wiki/Microscope. "A microscope ... is an instrument for viewing objects that are too small to be seen by the naked or unaided eye." (word origin information omitted).

It is therefore clear to any person of ordinary skill in the art that "functions of a microscope" or "settings of the microscope", as in claim 1, must be for a microscope, not for some unrelated or ancillary apparatus or function, e.g. changing intensity or direction of a laser is not a function of a microscope unless it relates to seeing minute objects.

Abe et al. does not disclose or suggest anything at all concerning control of any function of a microscope using a display and in making such an assertion, the Examiner is over extending the reference based upon hindsight application of the present invention beyond any reasonable disclosure or suggestion actually within the Abe et al. reference.

Contrary to the position of the Examiner, Abe et al. **does not** disclose or suggest a device for controlling microscope functions; **does not** disclose or suggest a display (3) integrated into a

stand base portion; and **does not** disclose or suggest a display that can be used to perform settings of the microscope, call saved settings, and display warnings or notifications from the system (see also figs. 1-3). **It is irrelevant that other functions can also be controlled by the display in accordance with the presently claimed invention because the cited art does not disclose or suggest control of microscope functions whether or not additional functions can be controlled with the display.** Abe et al is in fact irrelevant to the present invention.

Abe et al does not disclose or suggest any such limitations or requirements.

Abe et al does not disclose or suggest a central display **integrated into the stand base portion.** The display of Abe et al. has a display (control panel 3) integrated into a laser oscillator 1 **not into a stand base portion as has always been required by claim 1.** For this reason alone the rejection under 35 U.S.C. 102 must be withdrawn since each and every limitation of the claim must be disclosed in the reference for such an anticipation rejection under 35 U.S.C. 102 to be proper. Further, there is no suggestion at all of incorporating a central display into a stand base portion of a microscope system. In addition there is no disclosure or suggestion of "**a central display is used to perform a plurality of settings of the microscope within the microscope system**" as presented in claim 1 as amended.

The control panel of Abe et al does not appear to be directed to controlling any functions of a microscope and certainly not a plurality of such microscope functions. Rather, the control panel of Abe et al is directed to controlling laser treatment energy for laser eye surgery and there appears to be no suggestion of any control of microscope function. The control panel of Abe et

al. can in no way be used to control "a plurality" of the functions of a microscope and no such display having such ability is remotely suggested.

The present claims require that the "...display can be used to perform a plurality of settings of the microscope within the microscope system." **It is irrelevant that other functions can also be controlled by the display in accordance with the invention because <u>the cited art does not disclose or suggest control of microscope functions whether or not additional functions can be controlled with the display.</u>**

The Examiner has rejected claims 3 and 31 under 35 U.S.C. 103 as being unpatentable over Abe (et al) above. This rejection should be reversed.

With respect to claim 3, after the Examiner admits that: "Abe does not disclose the display to display main, sub-main, and submenus", the **Examiner simply states, without citation of any supporting reference**, that:

> "This type of 'nested' menu structure is very well known and commonly used in display systems. It would have been obvious to use such a menu structure including these types of menus in Abe's system in order to organize the information and control systems, thus making them easy to use."

There is no discussion at all by the Examiner of their unique use in conjunction with microscopic functions and no cited support for use with microscopic functions or even for their use with anything. The use of such a system to control microscopic functions is unique and unobvious to one skilled in the art, especially within a display in a microscope stand.

With respect to claim 31, the rejection is even more clearly improper.

Claim 31, depending from claim 1, requires that the plurality of settings that can be performed include at least one of objective selection and secondary magnification. There is

absolutely no suggestion in Abe et al of any display or control capable of performing either of such settings and certainly not in conjunction with other microscopic functions.

The Examiner admits:

> "Regarding claim 31, Abe does not specifically teach the display to control either objective selection or magnification selection."

The Examiner then simply states without any reference in support,

> "However, Abe discloses both of these functions in relation to a microscope. It would have been obvious to the ordinary skilled artisan at the time of the invention to use Abe's display/control to control either or both of these functions in order to provide the user with convenient location of all of the controls of the system, thus making the system more efficient and compact."

This is impermissible hindsight at its most egregious. Abe et al does not disclose or suggest the use of a display to control microscope functions at all, yet the Examiner takes the unsupported hindsight position that it would be obvious to take manual controls from a microscope associated with the Abe et al. structure and incorporate them into a display that Abe et al only uses for treatment lasers. **If the advantages are so clear, as the Examiner would have us believe, why did Abe et al. not actually incorporate microscopic controls into the display. The answer is clear, prior to the present invention, it was not obvious to one skilled in the art from Abe et al., to incorporate microscope controls into a display and certainly not within a microscope stand.**

The claims clearly do not stand or fall together. Claim 3 includes the further limitation over claim 1 wherein a main menu is constructed from multiple sub-main menus; and depending on the selection of the sub-main menu by the user, a respective submenu corresponding to the selected sub-main menu is displayable on the display. This further limitation lends patentability

over and above the patentable limitations already in claim 1. Claim 31 includes the limitation where the plurality of settings that can be performed includes at least one of objective selection and secondary magnification selection. This further limitation lends patentability over and above the patentable limitations already in claim 1.

The rejections should be reversed and claims 1, 3 and 31 should be allowed.

In view of the foregoing, it is clear that the pending claims are patentable over the cited prior art. Reversal of the Examiner and allowance of all claims are therefore respectfully requested.

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Dated: July 25, 2007

Claims Appendix

Reprinted below are the claims involved in the appeal:

1. A device for controlling functions of a microscope within a microscope system, said device comprising: a stand base portion, a central display integrated into the stand base portion, wherein the central display can be used to perform a plurality of settings of the microscope within the microscope system, to call saved settings of the microscope within the microscope system and to receive warning messages or notifications from the microscope within the microscope system.

3. The device as defined in Claim 1, wherein a main menu is constructed from multiple sub-main menus; and depending on the selection of the sub-main menu by the user, a respective submenu corresponding to the selected sub-main menu is displayable on the display.

31. The device of claim 1 where the plurality of settings that can be performed includes at least one of objective selection and secondary magnification selection.

Evidence Appendix

Exhibit A. McGraw Hill's Dictionary of Scientific and Technical Terms, 2nd edition, (1978) at page 1023 entered in October 27, 2006 reply to office action dated August 2, 2006. Copy attached.

Exhibit B. http://en.wikipedia.org/wiki/Microscope, Web site Screen shot of October 27, 2006, entered in October 27, 2006 reply to office action dated August 2, 2006. Copy attached.

ing an object in a series of mediums of graded refractive index until one is found that makes the object invisible in a phase-contrast microscope.

microrelief [GEOGR] Irregularities of the land surface causing variations in elevation amounting to no more than a few feet.

microresistivity survey [PETRO ENG] General term for downhole resistivity surveys of oil-bearing formations; includes microlog and microlaterolog surveys.

microrheology [MECH] A branch of rheology in which the heterogeneous nature of dispersed systems is taken into account.

Microsauria [PALEON] An order of Carboniferous and early Permian lepospondylous amphibians.

microsclere [INV ZOO] A minute sclerite in Porifera.

microscope [OPTICS] An instrument through which minute objects are enlarged by means of a lens or lens system; principal types include optical, electron, and x-ray.

microscope stage [OPTICS] The platform on which specimens are placed for microscopic examination.

microscopic [OPTICS] *See* microscopical. [SCI TECH] Of extremely small size.

microscopical [OPTICS] Also known as microscopic. 1. Of or pertaining to the microscope. 2. Visible only under a microscope.

nicroscopical diagnosis [PATH] Identification of a disease by microscopic examination of specimens taken from the patient.

nicroscopic anisotropy [PETRO ENG] Phenomenon in electrical downhole logging wherein electric current flows most easily along the water-filled interstices, usually parallel to sedimentary bed strata.

icroscopic reversibility [STAT MECH] A principle which requires that in a system at equilibrium any molecular process and its reverse take place at the same average rate. Also known as reversibility principle.

icroscopic state [STAT MECH] The state of a system as specified by the actual properties of each individual, elemental component, in the ultimate detail permitted by the uncertainty principle. Also known as microstate.

croscopic stress [MET] Residual stress ranging from compression to tension in a metal within a distance often comparable to the grain size. Also known as microstress.

croscopic theory [PHYS] A theory concerned with the interactions of atoms, molecules, or their constituents, involving distances on the order of 10^{-10} meter or less, which underlie observable phenomena.

roscopist [SCI TECH] An individual skilled in the use of e microscope.

roscopy [OPTICS] The interpretive application of microscope magnification to the study of materials that cannot be properly seen by the unaided eye.

rosecond [MECH] A unit of time equal to one-millionth a second. Abbreviated μs.

rosegregation [MET] Segregation within a grain, crystal, particle of microscopic size.

oseism [GEOPHYS] A weak, continuous, oscillatory motion in the earth having a period of 1–9 seconds and caused by variety of agents, especially atmospheric agents; not related to an earthquake.

oseismic instrument [MIN ENG] An instrument for the ly of roof strata and supports; it is inserted in holes, drilled selected points, for listening to subaudible vibrations that cede rock failure.

oseptum [INV ZOO] An incomplete or imperfect mesentery in zoantharians.

oshrinkage [MET] A casting defect consisting of interdritic voids, visible only at magnifications over 10 diam-.

some [CYTOL] 1. A fragment of the endoplasmic reticulum. 2. A minute granule of protoplasm.

spec function [ADP] The set of microinstructions h performs a specific operation in one or more machine s.

species [ECOL] A small, localized species population s clearly differentiated from related forms. Also known danon.

microspectrograph [SPECT] A microspectroscope provided with a photographic camera or other device for recording the spectrum.

microspectrophotometer [SPECT] A split-beam or double-beam spectrophotometer including a microscope for the localization of the object under study, and capable of carrying out spectral analyses within the dimensions of a single cell.

microspectroscope [SPECT] An instrument for analyzing the spectra of microscopic objects, such as living cells, in which light passing through the sample is focused by a compound microscope system, and both this light and the light which has passed through a reference sample are dispersed by a prism spectroscope, so that the spectra of both can be viewed simultaneously.

microspherulitic [PETR] Of the texture of an igneous rock, having spherulitic character visible only under the microscope.

Microsporaceae [BOT] A monogeneric family of green algae in the suborder Ulotrichineae; the chloroplast is a parietal network.

microsporangium [BOT] A sporangium bearing microspores.

microspore [BOT] The smaller spore of heterosporous plants; gives rise to the male gametophyte.

Microsporida [INV ZOO] The single order of the class Microsporidea.

Microsporidae [INV ZOO] The equivalent name for Sphaeriidae.

Microsporidea [INV ZOO] A class of Cnidospora characterized by the production of minute spores with a single intrasporal filament or one or two intracapsular filaments and a single sporoplasm; mainly intracellular parasites of arthropods and fishes.

microsporidiosis [VET MED] Infection with microsporidians.

microsporophyll [BOT] A sporophyll bearing microsporangia.

microstate *See* microscopic state.

microstress *See* microscopic stress.

microstrip [ELECTROMAG] A strip transmission line that consists basically of a thin-film strip in intimate contact with one side of a flat dielectric substrate, with a similar thin-film ground-plane conductor on the other side of the substrate.

microstructure [SCI TECH] The structure of an object, organism, or material as revealed by a microscope of a magnification over 10 times.

microstylolite [PETR] A stylolite in which the surface relief is less than 1 millimeter.

microsurgery [BIOL] Surgery on single cells by micromanipulation.

Microswitch [ELEC] A trade name for a small switch in which contact is made or broken by a slight motion.

microsystem electronics *See* microelectronics.

Microtatobiotes [BIOL] An artificial taxonomic category, comprising two unrelated groups of biological entities, the rickettsiae and the viruses.

microtectonics *See* structural petrology.

microtherm [ECOL] A plant requiring a mean annual temperature range of 0–14°C for optimum growth.

microthermal climate [CLIMATOL] A temperature province in both of C. W. Thornthwaite's climatic classifications, generally described as a "cool" or "cold winter" climate.

microthrowing power [PHYS CHEM] Relative ability of an electroplating solution to deposit metal in a small, shallow aperture or crevice not exceeding a few thousandths of an inch in dimensions.

Microtinae [VERT ZOO] A subfamily of rodents in the family Muridae that includes lemmings and muskrats.

microtome [ENG] An instrument for cutting thin sections of tissues or other materials for microscopical examination.

microtomy [BIOL] Cutting of thin sections of specimens with a microtome.

Microtragulidae [PALEON] A group of saltatorial caenolistoid marsupials that appeared late in the Cenozoic and paralleled the small kangaroos of Australia.

microtrichia [INV ZOO] Small hairs on the integument of various insects, especially on the wings.

microtron [NUCLEO] A type of circular particle accelerator for accelerating electrons to energies of several million

MICROSAURIA

Microbrachis, a microsaur from the Late Pennsylvanian epoch. *(After Steen)*

MICROSCLERE

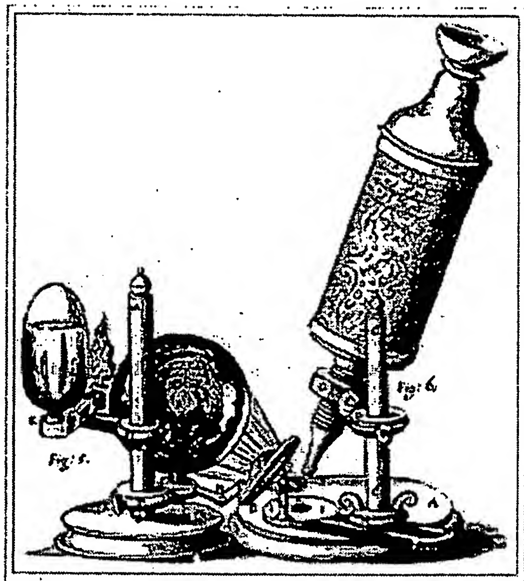
Shapes of various microscleres.

Microscope

EXHIBIT B

From Wikipedia, the free encyclopedia

A **microscope** (Greek: *μικρόν* (*micron*) = small + *σκοπε□ν* (*skopein*) = to look at) is an instrument for viewing objects that are too small to be seen by the naked or unaided eye. The science of investigating small objects using such an instrument is called microscopy, and the term *microscopic* means minute or very small, not easily visible with the unaided eye. In other words, requiring a *microscope* to examine. Microscopes give us a large image of a tiny object. The microscopes we use in school and at home trace their history back almost 400 years.



Robert Hooke's **microscope** (1665) - an **engineered** device used to study living systems.

The first useful microscope was developed in the Netherlands in the early 1600s. There is almost as much confusion about the inventor as about the dates. Three different eyeglass makers have been given credit for the invention: Hans Lippershey (who also developed the first real telescope); Hans Janssen; and his son, Zacharias.

The most common type of microscope—and the first to be invented—is the optical microscope. This is an optical instrument containing one or more lenses that produce an enlarged image of an object placed in the focal plane of the lens(es). There are, however, many other microscope designs.

Contents

- 1 Types
  - 1.1 Optical microscopes
  - 1.2 Electron microscopes
  - 1.3 Scanning probe microscope
  - 1.4 Point-projection microscopes
  - 1.5 Other microscopes
- 2 See also

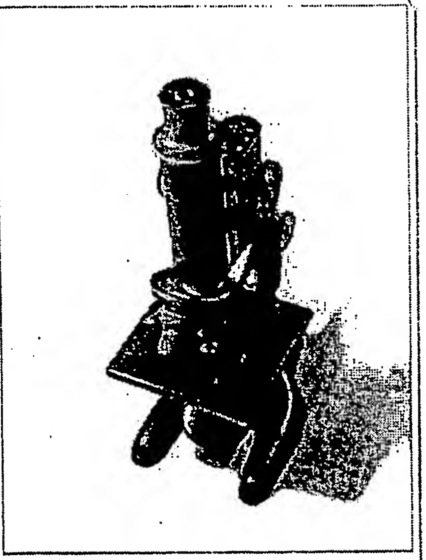
Types

Microscopes can largely be separated into two classes, optical theory microscopes and scanning probe microscopes.

Optical theory microscopes are microscopes which function through the optical theory of lenses in order to magnify the image generated by the passage of a wave through the sample. The waves used are either electromagnetic in optical microscopes or electron beams in electron microscopes. The types are the Compound Light, Stereo, and the electron microscope.

Optical microscopes

Optical microscopes, through their use of visible wavelengths of light, are the simplest and hence most widely used type of microscope. Recent research has


A 1915 Bausch and Lomb Optical microscope.

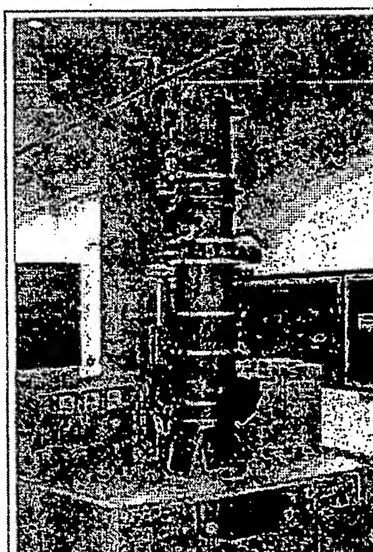
shown (see Brian J. Ford's research on simple microscopes (http://www.brianjford.com/wav-spf.htm)) that even simple microscopes, those with a single small lens, gave amazingly clear images to the earliest microscopists. Today **compound microscopes**, i.e., especially those with a series of lenses, serve uses in many fields of science, particularly biology and geology.


A stereo microscope is often used for lower-power magnification on large subjects.

Optical microscopes use refractive lenses, typically of glass and occasionally of plastic, to focus light into the eye or another light detector. Typical magnification of a light microscope is up to 1500x with a theoretical resolution of around 0.2 micrometres. Specialised techniques (e.g., scanning confocal microscopy) may exceed this magnification but the resolution is an insurmountable diffraction limit.

Other microscopes which use electromagnetic wavelengths not visible to the human eye are often called optical microscopes. The most common of these, due to its high resolution yet no requirement for a vacuum like electron microscopes, is the x-ray microscope.

Electron microscopes


Electron microscope

Electron microscopes, which use beams of electrons instead of light, are designed for very high magnification usage. Electrons, which have a much smaller wavelength than visible light, allow a much higher resolution. The main limitation of the electron beam is that it must pass through a vacuum as air molecules would otherwise scatter the beam.

Instead of relying on refraction, lenses for electron microscopes are specially designed electromagnets which generates magnetic fields that are approximately parallel to the direction that electrons travel. The electrons are typically detected by a phosphor screen, photographic film or a CCD.

Two major variants of electron microscopes exist:

- Scanning electron microscope: looks at the surface of bulk objects by scanning the surface with a fine electron beam and measuring reflection. May also be used for spectroscopy.
- Transmission electron microscope: passes electrons completely through the sample, analogous to basic optical microscopy. This requires careful sample preparation, since electrons are scattered so strongly by most materials. It can also obtain detailed information on the sample's crystallography through selected area diffraction.

Scanning probe microscope

In scanning probe microscopy (SPM), a physical probe is used either in close contact to the sample or nearly

touching it. By rastering the probe across the sample, and by measuring the interactions between the sharp tip of the probe and the sample, a micrograph is generated. The exact nature of the interactions between the probe and the sample determines exactly what kind of SPM is being used. Because this kind of microscopy relies on the interactions between the tip and the sample, it generally only measures information about the surface of the sample.

Some kinds of SPMs are:

- Atomic force microscope
- Scanning tunneling microscope
- Electric force microscope
- Magnetic force microscope (MFM)
- Near-field scanning optical microscope

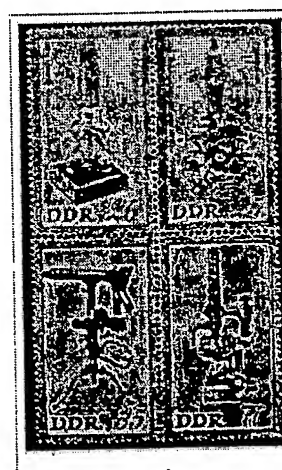
Point-projection microscopes

The field emission microscope, field ion microscope, and the Atom Probe are examples of point-projection microscopes where ions are excited from a needle-shaped specimen and hit a detector. The Atom-Probe Tomograph (APT) is the most modern incarnation and allows a three-dimensional atom-by-atom (with chemical elements identified) reconstruction with sub-nanometer resolution.

Other microscopes

Acoustic microscopes use sound waves to measure variations in acoustic impedance. Similar to SONAR in principle, they are used for such jobs as detecting defects in the subsurfaces of materials including those found in integrated circuits.

See also



Different microscopes

- Microscopy
- Optical Microscope
- Electron Microscope
- X-ray microscope
- Fluorescent microscopy
- Fluorescence interference contrast microscopy
- Darkfield microscope
- Phase contrast microscopy
- Angular resolution
- Microscope image processing
- Microscope slide
- Microscopy laboratory (http://textbook.wikipedia.org/wiki/Botany:_Microscopy_laboratory) in: *A Study Guide to the Science of Botany* at Wikibooks
- Telescope
- Common acronyms in microscopy
- Condensed Matter Physics

Laboratory Equipment [hide]

Agar plate • Aspirator • Autoclave • Bunsen burner • Calorimeter • Colony counter • Colorimeter • Centrifuge • Fume hood • Incubator • Laminar flow cabinet • Magnetic stirrer • **Microscope** • Microtiter plate • Plate reader • Spectrophotometer • Stir bar •

Thermometer • Vortex mixer • Static mix...

Laboratory glassware

Beaker • Boiling tube • Büchner funnel • Burette • Condenser • Conical measure • Crucible • Cuvette • Laboratory flasks (Erlenmeyer flask, Round-bottom flask, Florence flask, Volumetric flask, Büchner flask, Retort) • Gas syringe • Graduated cylinder • Pipette • Petri dish • Separating funnel • Soxhlet extractor • Test tube • Thistle tube • Watch glass

Categories: Articles with unsourced statements since February 2007 | All articles with unsourced statements | Microscopy | Microscopes | Microbiology equipment

Related Proceedings Appendix

NONE